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EXAMINER	
WONG, EDNA	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/789,175	CAPPER ET AL.	
	Examiner	Art Unit	
	EDNA WONG	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 January 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,43,44,46-53 and 55-63* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,43,44,46-53 and 55-63* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 24, 2008 has been entered.

This is in response to the Amendment dated January 24, 2008. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office Action.

Response to Arguments

Claim Objections

Claims **1, 43, 45, 54 and 64** have been objected to because of minor informalities.

The objection of claims 1, 43, 45, 54 and 64 has been withdrawn in view of Applicants' amendment.

Claim Rejections - 35 USC § 112

Claim **6, 50, 60 and 64** has been rejected under 35 U.S.C. 112, second

paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The rejection of claims 6, 50, 60 and 64 under 35 U.S.C. 112, second paragraph, has been withdrawn in view of Applicants' amendment.

Claim Rejections - 35 USC § 103

I. Claims **1-10** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **GB 2,104,920** ('920) in combination with **JP 06-116781** ('781).

The rejection of claims 1-10 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with JP 06-116781 ('781) has been withdrawn in view of Applicants' amendment.

II. Claims **43 and 44** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **GB 2,104,920** ('920) in combination with **JP 06-116781** ('781).

The rejection of claims 43 and 44 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with JP 06-116781 ('781) has been withdrawn in view of Applicants' amendment.

III. Claim **45** has been rejected under 35 U.S.C. 103(a) as being unpatentable over **GB 2,104,920** ('920) in combination with **JP 06-116781** ('781) as applied to claims 1-10 above.

The rejection of claim 45 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with JP 06-116781 ('781) as applied to claims 1-10 above has been withdrawn in view of Applicants' amendment. Claim 45 has been cancelled.

IV. Claims **46-47 and 49-54** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **GB 2,104,920** ('920) in combination with **JP 06-116781** ('781) as applied to claims 43 and 44 above.

The rejection of claims 46-47 and 49-54 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with JP 06-116781 ('781) as applied to claims 43 and 44 above has been withdrawn in view of Applicants' amendment. Claim 54 has been cancelled.

V. Claim **48** has been rejected under 35 U.S.C. 103(a) as being unpatentable over **GB 2,104,920** ('920) in combination with **JP 06-116781** ('781) as applied to claims 43 and 44 above, and further in view of **JP 64-68488** ('488).

The rejection of claim 48 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with JP 06-116781 ('781) as applied to claims 43 and 44 above, and further in view of JP 64-68488 ('488) has been withdrawn in view of Applicants' amendment.

VI. Claims **55-64** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **GB 2,104,920** ('920) in combination with **JP 06-116781** ('781) and **JP 64-68488** ('488).

The rejection of claims 55-64 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with JP 06-116781 ('781) and JP 64-68488 ('488) has been withdrawn in view of Applicants' amendment. Claim 64 has been cancelled.

VII. Claims **1, 3-8, 10 and 45** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **GB 2,104,920** ('920) in combination with **JP 64-68488** ('488).

The rejection of claims 1, 3-8, 10 and 45 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with JP 64-68488 ('488) has been withdrawn in view of Applicants' amendment. Claim 45 has been cancelled.

VIII. Claims **1-4, 6-10 and 45** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **GB 2,104,920** ('920) in combination with **Irie et al.** (US Patent No. 4,581,107).

The rejection of claims 1-4, 6-10 and 45 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with Irie et al. has been withdrawn in view of Applicants' amendment. Claim 45 has been cancelled.

IX. Claims **43, 46-48 and 50-54** have been rejected under 35 U.S.C. 103(a) as being

unpatentable over **GB 2,104,920** ('920) in combination with **JP 64-68488** ('488).

The rejection of claims 43, 46-48 and 50-54 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with JP 64-68488 ('488) has been withdrawn in view of Applicants' amendment. Claim 54 has been cancelled.

X. Claims **43-47 and 49-54** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **GB 2,104,920** ('920) in combination with **Irie et al.** (US Patent No. 4,581,107).

The rejection of claims 43-47 and 49-54 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with Irie et al. has been withdrawn in view of Applicants' amendment. Claims 45 and 54 have been cancelled.

XI. Claims **55-57 and 59-64** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **GB 2,104,920** ('920) in combination with **Irie et al.** (US Patent No. 4,581,107).

The rejection of claims 55-57 and 59-64 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with Irie et al. has been withdrawn in view of Applicants' amendment. Claim 64 been cancelled.

XII. Claim **58** has been rejected under 35 U.S.C. 103(a) as being unpatentable over **GB 2,104,920** ('920) in combination with **Irie et al.** (US Patent No. 4,581,107) as

applied to claims 55-57 and 59-64 above, and further in view of **JP 64-68488** ('488).

The rejection of claim 58 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with Irie et al. as applied to claims 55-57 and 59-64 above, and further in view of JP 64-68488 ('488) has been withdrawn in view of Applicants' amendment.

XIII. Claims **1, 3-4, 6-10 and 45** has been rejected under 35 U.S.C. 103(a) as being unpatentable over **GB 2,104,920** ('920) in combination with **Wolski et al.** (US Patent No. 4,572,768).

The rejection of claims 1, 3-4, 6-10 and 45 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with Wolski et al. has been withdrawn in view of Applicants' amendment. Claim 45 has been cancelled.

XIV. Claims **43, 46-47 and 49-54** are rejected under 35 U.S.C. 103(a) as being unpatentable over **GB 2,104,920** ('920) in combination with **Wolski et al.** (US Patent No. 4,572,768).

The rejection of claims 43, 46-47 and 49-54 under 35 U.S.C. 103(a) as being unpatentable over GB 2,104,920 ('920) in combination with Wolski et al. has been withdrawn in view of Applicants' amendment. Claim 54 has been cancelled.

Response to Amendment

Claim Objections

Claim **6** is objected to because of the following informalities:

Claim 6

line 18, the word -- a -- should be inserted after "R^4 =".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

Claims **3-4, 6, 46-47, 50, 56-57 and 60** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3

line 1, "the zinc ion" (singular) lacks antecedent basis.

line 2, "the nickel ion" (singular) lacks antecedent basis.

lines 2-3, "the alloy comprising a nickel content from about 3 wt% to about 25 wt%" lacks antecedent basis.

Claim 4

line 1, "the zinc ion" (singular) lacks antecedent basis.

line 2, "the nickel ion" (singular) lacks antecedent basis.

lines 2-3, "the alloy comprising a nickel content from about 8 wt% to about 22 wt%" lacks antecedent basis.

Claim 6

lines 19-20, recites "wherein Z independently may be H, an alkali metal ion, ***or*** Z_2 may be an alkaline earth metal ion, $-NH_2$, -Cl or –Br". If more than one compound of (IIa) are present in the bath, then what is the definition of Z ***and*** Z_2?

line 19, the words "may be" are indefinite.

line 20, the words "may be" are indefinite.

Claim 46

lines 1-2, "the zinc ion" (singular) lacks antecedent basis.

line 2, "the nickel ion" (singular) lacks antecedent basis.

lines 2-3, "the alloy comprising a nickel content from about 3 wt% to about 25 wt%" lacks antecedent basis.

Claim 47

lines 1-2, "the zinc ion" (singular) lacks antecedent basis.

line 2, "the nickel ion" (singular) lacks antecedent basis.

lines 2-3, "the alloy comprising a nickel content from about 8 wt% to about 22 wt%" lacks antecedent basis.

Claim 50

lines 19-20, recites "wherein Z independently may be H, an alkali metal ion, ***or*** Z_2 may be an alkaline earth metal ion, $-NH_2$, -Cl or –Br". If more than one compound of (IIa) are present in the bath, then what is the definition of Z ***and*** Z_2?

line 19, the words "may be" are indefinite.

line 20, the words "may be" are indefinite.

Claim 56

lines 1-2, "the zinc ion" (singular) lacks antecedent basis.

line 2, "the nickel ion" (singular) lacks antecedent basis.

lines 2-3, "the alloy comprising a nickel content from about 3 wt% to about 25 wt%" lacks antecedent basis.

Claim 57

lines 1-2, "the zinc ion" (singular) lacks antecedent basis.

line 2, "the nickel ion" (singular) lacks antecedent basis.

lines 2-3, "the alloy comprising a nickel content from about 8 wt% to about 22 wt%" lacks antecedent basis.

Claim 60

lines 19-20, recites "wherein Z independently may be H, an alkali metal ion, ***or*** Z_2 may be an alkaline earth metal ion, $-NH_2$, -Cl or –Br". If more than one compound of (IIa) are present in the bath, then what is the definition of Z ***and*** Z_2?

line 19, the words "may be" are indefinite.

line 20, the words "may be" are indefinite.

Claim Rejections - 35 USC § 103

I. Claims **1-4 and 6-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Irie et al.** (US Patent No. 4,581,107) in combination with **GB 2,104,920** ('920) and **Osetrova** ("Use of Ethylenediamine in Electroplating", *Sbornik Nauchnykh Trudov - Institut Tsvetnykh Metallov im. M. I. Kalinina* (1960), Vol. 33, pp. 396-399).

Irie teaches an electroplating bath for depositing a zinc-nickel ternary or higher alloy, comprising:

(a) zinc ions (= Zn^{2+}) [col. 2, line 59];

(b) nickel ions (= Ni^{2+}) [col. 2, line 59]; and

(c) from about 0.01 g/dm^3 to about 10 g/dm^3 of one or more ionic species selected from ions of Te^{+4}, Bi^{+3} and $\underline{Sb^{+3}}$ (= less than 2 g/l of at least one of Al^{3+}, Mg^{2+}, Fe^{3+}, Cr^{3+}, In^{3+} and $\underline{Sb^{3+}}$) [col. 2, lines 60-61; and col. 3, lines 5-6], with the proviso that when the ionic species comprises Te^{+4}, the bath further comprises one or more additional ionic species selected from ions of Bi^{+3}, Sb^{+3}, Ag^{+1}, Cd^{+2}, Co^{+2}, Cr^{+3}, Cu^{+2}, Fe^{+2}, In^{+3}, Mn^{+2}, Mo^{+6}, P^{+3}, Sn^{+2} and W^{+6}.

When the ionic species comprises one or more of Bi^{+3} or $\underline{Sb^{+3}}$, the bath further comprises one or more additional ionic species selected from ions of Ag^{+1}, Cd^{+2}, Co^{+2},

Cr^{+3}, Cu^{+2}, Fe^{+2}, In^{+3}, Mn^{+2}, Mo^{+6}, P^{+3}, Sn^{+2} and W^{+6} (= at least one of Al^{3+}, Mg^{2+}, Fe^{3+}, Cr^{3+}, In^{3+} and Sb^{3+}) [col. 2, lines 60-61; and col. 3, lines 5-6].

The zinc ion (= 10-40 g/l Zn^{2+}) and the nickel ion (= 15-160 g/l Ni^{2+}) [col. 2, line 59; and col. 3, line 4] are present in the bath at concentrations sufficient to deposit a zinc-nickel alloy comprising a nickel content from about 3 wt% to about 25 wt% of the alloy (= 10-13 wt% Ni) [cols. 5-6, Table 3].

The zinc ion (= 10-40 g/l Zn^{2+}) and the nickel ion (= 15-160 g/l Mi^{2+}) [col. 2, line 59; and col. 3, line 4] are present in the bath at concentrations sufficient to deposit a zinc-nickel alloy comprising a nickel content from about 8 wt% to about 22 wt% of the alloy (= 10-13 wt% Ni) [cols. 5-6, Table 3].

The bath comprises an acidic pH (= pH 2.0) [cols. 5-6, Table 1].

The concentration of Sb^{3+} is in the range from 0.1 to 3 g/dm^3 (= less than 2 g/l of at least one of Al^{3+}, Mg^{2+}, Fe^{3+}, Cr^{3+}, In^{3+} and Sb^{3+}) [col. 2, lines 60-61; and col. 3, lines 5-6].

The bath of Irie differs from the instant invention because Irie does not disclose the following:

a. Wherein the electroplating bath comprises (d) one or more non-ionogenic surface active polyalkylene compound, as recited in claim 1.

b. Wherein the one or more non-ionogenic surface active polyoxyalkylene compound comprises:

(i) one or more compound having a formula:

$$R^1\text{-}O\text{-}[(CH_2)_nO]_xH \qquad \text{(Ia)}$$

or

$$R^1\text{-}O\text{-}[(CHR^2CH_2O]_xH \qquad \text{(Ib)}$$

or

$$R^1\text{-}O\text{-}[(CH_2CHR^2)O]_xH \qquad \text{(Ic)}$$

wherein R^1 is an aryl or alkyl group containing up to about 24 carbon atoms, R^2 is an alkyl group containing from 1 to about 4 carbon atoms, n is 2 or 3, and x is an integer between 2 and about 100;

(ii) one or more compound having a formula:

$$R^3\text{-}O\text{-}[R^4\text{-}O\text{-}]_n\text{-}X \qquad \text{(IIa)}$$

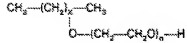
or

$$(R^3\text{-}O\text{-}[R^4\text{-}O\text{-}]_n)_a\text{-}Y \qquad \text{(IIb)}$$

wherein R^3 = a C_1-C_{18} branched or unbranched alkyl, alkylene or alkynyl group, or phenyl-O-$[R^5$-O-$]_m$-CH_2-, in which m = 0-100 and R^5 is a C_1-C_4 branched or unbranched alkylene; R^4 = C_1-C_4 branched or unbranched alkylene; X = H, -SO_2Z, -SO_3Z, -SO_4Z, -PO_4Z_2, wherein Z independently may be H, an alkali metal ion, or Z_2 may be an alkaline earth metal ion, -NH_2, -Cl or -Br; Y is an aliphatic polyhydroxy group, an amine group, a polyamine group or a mercaptan group, and a is equal to or less than the number of active hydrogens in OH, -NH, NH_2 or -SH groups on the Y component; or (iii) a mixture of two or more of (i) and/or (ii), as recited in claim 6.

Like Irie, GB '920 teaches an electroplating bath for depositing a zinc-nickel alloy deposit. GB '920 teaches that a nonionic polyoxyalkylated surfactant is present in an amount at least sufficient to provide grain refinement of the zinc-nickel alloy electrodeposit and produce a deposit which is at least semi-bright in appearance (page 2, lines 78-89). An example of a typical suitable surfactant of this type is:

A. Nonionic adducts of ethylene oxide and linear alcohols having the formula:

 (page 2, lines 105-117).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electroplating bath described by Irie with (a) and (b) above because a nonionic polyoxyalkylated surfactant would have provided grain refinement of the zinc-nickel alloy electrodeposit and produced a deposit which is at least semi-bright in appearance as taught by GB '920 (page 2, lines 105-117).

c. Wherein the electroplating bath further comprises ethylenediamine or its methyl-substituted derivatives; propylenediamine or its methyl-substituted derivatives; diethylenetriamine or its methyl-substituted derivatives; or a polymer of an aliphatic amine, as recited in claim 1.

Irie teaches that the metal ions can be added in the plating bath in the form of a suitable *salt of the metal*. Chlorides, *sulfates*, nitrates and acetates can advantageously

be used (col. 3, lines 39-44).

Osetrova teaches electrodepositing Cu, Zn, Cd, Ni, and Co whose ethylenediamine complexes are obtained directly by the reaction of aqueous solutions of their simple salts with ethylenediamine (**I**). By replacing ***sulfate*** and cyanide electrolytes with **I**, a more uniform Cu coating was obtained, and Cu plating of Fe was possible. The Cu coatings thus obtained have a high degree of adhesion (abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electroplating bath described by Irie with wherein the electroplating bath further comprises ethylenediamine or its methyl-substituted derivatives; propylenediamine or its methyl-substituted derivatives; diethylenetriamine or its methyl-substituted derivatives; or a polymer of an aliphatic amine because by replacing ***sulfate*** and cyanide electrolytes with **I**, a more uniform coating would have been obtained having a high degree of adhesion as taught by Osetrova (abstract).

d. Wherein the bath comprises an alkaline pH, as recited in claim 8.

e. Wherein the bath further comprises a compound represented by the formula:

$$R^7(R^6)N\text{-}R^{11}\text{-}N(R^9)R^{10} \qquad (V)$$

wherein R^7, R^8, R^9 and R^{10} are each independently alkyl or hydroxyalkyl groups provided that one or more of R^7-R^{10} is a hydroxy alkyl group, and R^{11} is a

hydrocarbylene group containing up to about 10 carbon atoms, or a mixture of two or more thereof, as recited in claim 10.

GB '920 teaches that the pH of the electroplating baths is from 4.7 to 8 (page 3, lines 103-155). In some instances, where the bath is operated at the high end of pH range, e.g., a pH of 7 to 8, it may also be desirable to include a suitable complexing agent in the bath to prevent precipitation of the zinc and/or nickel metal. A typical complexing agent which is *Quadrol* (page 3, lines 116-128).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the bath described by Irie with wherein the bath comprises an alkaline pH; and wherein the bath further comprises a compound represented by the formula:

$$R^7(R^6)N\text{-}R^{11}\text{-}N(R^9)R^{10} \qquad (V)$$

wherein R^7, R^8, R^9 and R^{10} are each independently alkyl or hydroxyalkyl groups provided that one or more of R^7-R^{10} is a hydroxy alkyl group, and R^{11} is a hydrocarbylene group containing up to about 10 carbon atoms, or a mixture of two or more thereof because zinc-nickel alloys have been electrodeposited from both acid and alkaline baths. In instances where the bath was operated at the high end of pH range, it was desirable to include a suitable complexing agent in the bath to prevent precipitation of the zinc and/or nickel metal as taught by GB '920 (page 3, lines 116-128).

II. Claims **1, 3-8 and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable

over **JP 64-68488** ('488) in combination with **GB 2,104,920** ('920) and **Osetrova** ("Use of Ethylenediamine in Electroplating", *Sbornik Nauchnykh Trudov - Institut Tsvetnykh Metallov im. M. I. Kalinina* (1960), Vol. 33, pp. 396-399).

JP '488 teaches an electroplating bath for depositing a zinc-nickel ternary or higher alloy, comprising:

(a) zinc ions (= from $ZnSO_4 \cdot 7H_2O$) [page 5, line 18];

(b) nickel ions (= from $NiSO_4 \cdot 6H_2O$) [page 5, line 17]; and

(c) one or more ionic species selected from ions of Te^{+4}, Bi^{+3} and Sb^{+3} (= 0 to 112 mg/l of Bi^{3+} *ions*) [page 5, line 21], with the proviso that when the ionic species comprises Te^{+4}, the bath further comprises one or more additional ionic species selected from ions of Bi^{+3}, Sb^{+3}, Ag^{+1}, Cd^{+2}, Co^{+2}, Cr^{+3}, Cu^{+2}, Fe^{+2}, In^{+3}, Mn^{+2}, Mo^{+6}, P^{+3}, Sn^{+2} and W^{+6}.

The zinc ion and the nickel ion are present in the bath at concentrations sufficient to deposit a zinc-nickel alloy comprising a nickel content from about 3 wt% to about 25 wt% of the alloy (= 9 to 18 wt% Ni) [page 6, lines 9-14].

The zinc ion and the nickel ion are present in the bath at concentrations sufficient to deposit a zinc-nickel alloy comprising a nickel content from about 8 wt% to about 22 wt% of the alloy (= 9 to 18 wt% Ni) [page 6, lines 9-14].

The bath comprises an acidic pH (= pH 1.6) [page 5, line 22].

The bath of JP '488 differs from the instant invention because JP '488 does not

disclose the following:

a. Wherein the one or more ionic species selected from ions of Te^{+4}, Bi^{+3} and Sb^{+3} is from about 0.01 g/dm^3 to about 10 g/dm^3, as recited in claim 1.

b. Wherein the concentration of Bi^{+3} is in the range from 0.2 to 2 g/dm^3, as recited in claim 5.

JP '488 teaches 0 to 112 mg/l of Bi^{3+} ions (page 5, line 21).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the BI^{3+} concentration described by JP '488 with wherein the one or more ionic species selected from ions of Te^{+4}, Bi^{+3} and Sb^{+3} is from about 0.01 g/dm^3 to about 10 g/dm^3; and wherein the concentration of Bi^{+3} is in the range from 0.2 to 2 g/dm^3 because it has been held that changes in temperature, concentration or both, is not a patentable modification; however, such changes may impart patentability to a process if the ranges claimed produce new and unexpected results which are different in kind and not merely in degree from results of the prior art, such ranges are termed "critical" ranges and Applicant has the burden of proving such criticality; even though Applicant's modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within capabilities of one skilled in the art; more particularly, where general conditions of the claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation. *In re Aller*, 220 F2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) and MPEP § 2144.05.

c. Wherein the electroplating bath comprises (d) one or more non-ionogenic surface active polyalkylene compound, as recited in claim 1.

d. Wherein the one or more non-ionogenic surface active polyoxyalkylene compound comprises:

(i) one or more compound having a formula:

$$R^1\text{-}O\text{-}[(CH_2)_nO]_xH \qquad \text{(Ia)}$$

or

$$R^1\text{-}O\text{-}[(CHR^2CH_2O]_xH \qquad \text{(Ib)}$$

or

$$R^1\text{-}O\text{-}[(CH_2CHR^2)O]_xH \qquad \text{(Ic)}$$

wherein R^1 is an aryl or alkyl group containing up to about 24 carbon atoms, R^2 is an alkyl group containing from 1 to about 4 carbon atoms, n is 2 or 3, and x is an integer between 2 and about 100;

(ii) one or more compound having a formula:

$$R^3\text{-}O\text{-}[R^4\text{-}O\text{-}]_n\text{-}X \qquad \text{(IIa)}$$

or

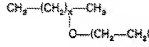
$$(R^3\text{-}O\text{-}[R^4\text{-}O\text{-}]_n)_a\text{-}Y \qquad \text{(IIb)}$$

wherein R^3 = a C_1-C_{18} branched or unbranched alkyl, alkylene or alkynyl group, or phenyl-O-[R^5-O-]$_m$-CH_2-, in which m = 0-100 and R^5 is a C_1-C_4 branched or unbranched alkylene; R^4 = C_1-C_4 branched or unbranched alkylene; X = H, -SO_2Z, -SO_3Z, -SO_4Z, -PO_4Z_2, wherein Z independently may be H, an alkali metal ion, or Z_2 may be an

alkaline earth metal ion, -NH_2, -Cl or -Br; Y is an aliphatic polyhydroxy group, an amine group, a polyamine group or a mercaptan group, and a is equal to or less than the number of active hydrogens in OH, -NH, NH_2 or -SH groups on the Y component; or (iii) a mixture of two or more of (i) and/or (ii), as recited in claim 6.

Like JP '488, GB '920 teaches an electroplating bath for depositing a zinc-nickel alloy deposit. GB '920 teaches that a nonionic polyoxyalkylated surfactant is present in an amount at least sufficient to provide grain refinement of the zinc-nickel alloy electrodeposit and produce a deposit which is at least semi-bright in appearance (page 2, lines 78-89). An example of a typical suitable surfactant of this type is:

A. Nonionic adducts of ethylene oxide and linear alcohols having the formula:



(page 2, lines 105-117).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electroplating bath described by JP '488 with (a) and (b) above because a nonionic polyoxyalkylated surfactant would have provided grain refinement of the zinc-nickel alloy electrodeposit and produced a deposit which is at least semi-bright in appearance as taught by GB '920 (page 2, lines 105-117).

e. Wherein the electroplating bath further comprises ethylenediamine or its methyl-substituted derivatives; propylenediamine or its methyl-substituted derivatives; diethylenetriamine or its methyl-substituted derivatives; or a polymer of an aliphatic

amine, as recited in claim 1.

JP '488 teaches $ZnSO_4 \cdot 7H_2O$ (page 5, line 18) and $NiSO_4 \cdot 6H_2O$ (page 5, line 17).

Osetrova teaches electrodepositing Cu, Zn, Cd, Ni, and Co whose ethylenediamine complexes are obtained directly by the reaction of aqueous solutions of their simple salts with ethylenediamine (**I**). By replacing ***sulfate*** and cyanide electrolytes with **I**, a more uniform Cu coating was obtained, and Cu plating of Fe was possible. The Cu coatings thus obtained have a high degree of adhesion (abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electroplating bath described by JP '488 with wherein the electroplating bath further comprises ethylenediamine or its methyl-substituted derivatives; propylenediamine or its methyl-substituted derivatives; diethylenetriamine or its methyl-substituted derivatives; or a polymer of an aliphatic amine because by replacing ***sulfate*** and cyanide electrolytes with **I**, a more uniform coating would have been obtained having a high degree of adhesion as taught by Osetrova (abstract).

f. Wherein the bath comprises an alkaline pH, as recited in claim 8.

g. Wherein the bath further comprises a compound represented by the formula:

$$R^7(R^6)N\text{-}R^{11}\text{-}N(R^9)R^{10} \qquad (V)$$

wherein R^7, R^8, R^9 and R^{10} are each independently alkyl or hydroxyalkyl groups provided that one or more of R^7-R^{10} is a hydroxy alkyl group, and R^{11} is a hydrocarbylene group containing up to about 10 carbon atoms, or a mixture of two or more thereof, as recited in claim 10.

GB '920 teaches that the pH of the electroplating baths is from 4.7 to 8 (page 3, lines 103-155). In some instances, where the bath is operated at the high end of pH range, e.g., a pH of 7 to 8, it may also be desirable to include a suitable complexing agent in the bath to prevent precipitation of the zinc and/or nickel metal. A typical complexing agent which is *Quadrol* (page 3, lines 116-128).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the bath described by JP '488 with wherein the bath comprises an alkaline pH; and wherein the bath further comprises a compound represented by the formula:

$$R^7(R^6)N\text{-}R^{11}\text{-}N(R^9)R^{10} \qquad (V)$$

wherein R^7, R^8, R^9 and R^{10} are each independently alkyl or hydroxyalkyl groups provided that one or more of R^7-R^{10} is a hydroxy alkyl group, and R^{11} is a hydrocarbylene group containing up to about 10 carbon atoms, or a mixture of two or more thereof because zinc-nickel alloys have been electrodeposited from both acid and alkaline baths. In instances where the bath was operated at the high end of pH range, it was desirable to include a suitable complexing agent in the bath to prevent precipitation of the zinc and/or nickel metal as taught by GB '920 (page 3, lines 116-128).

III. Claims **43-44, 46-47 and 49-53** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Irie et al.** (US Patent No. 4,581,107) in combination with **GB 2,104,920** ('920) and **Osetrova** ("Use of Ethylenediamine in Electroplating", *Sbornik Nauchnykh Trudov - Institut Tsvetnykh Metallov im. M. I. Kalinina* (1960), Vol. 33, pp. 396-399).

Irie, GB '920 and Osetrova are as applied as discussed above and incorporated herein.

IV. Claims **43, 46-48 and 50-53** are rejected under 35 U.S.C. 103(a) as being unpatentable over **JP 64-68488** ('488) in combination with **GB 2,104,920** ('920) and **Osetrova** ("Use of Ethylenediamine in Electroplating", *Sbornik Nauchnykh Trudov - Institut Tsvetnykh Metallov im. M. I. Kalinina* (1960), Vol. 33, pp. 396-399).

JP '488, GB '920 and Osetrova are as applied as discussed above and incorporated herein.

V. Claims **55-57 and 59-63** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Irie et al.** (US Patent No. 4,581,107) in combination with **GB 2,104,920** ('920) and **Osetrova** ("Use of Ethylenediamine in Electroplating", *Sbornik Nauchnykh Trudov - Institut Tsvetnykh Metallov im. M. I. Kalinina* (1960), Vol. 33, pp. 396-399).

Irie, GB '920 and Osetrova are as applied as discussed above and incorporated

herein.

VI. Claims **55-58 and 60-63** are rejected under 35 U.S.C. 103(a) as being unpatentable over **JP 64-68488** ('488) in combination with **GB 2,104,920** ('920) and **Osetrova** ("Use of Ethylenediamine in Electroplating", *Sbornik Nauchnykh Trudov - Institut Tsvetnykh Metallov im. M. I. Kalinina* (1960), Vol. 33, pp. 396-399).

JP '488, GB '920 and Osetrova are as applied as discussed above and incorporated herein.

Citations

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

JP 2-25600 is cited to teach electroplating a Zn-Ni base alloy containing at least one additional alloying element such as P, Co, Cr, Sn, Sb, V, Fe, Ti, Ni, Mn, As and Bi (abstract).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDNA WONG whose telephone number is (571) 272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

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/Edna Wong/
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EW
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